

Quaternary Fault and Fold Database of the United States

As of January 12, 2017, the USGS maintains a limited number of metadata fields that characterize the Quaternary faults and folds of the United States. For the most up-to-date information, please refer to the [interactive fault map](#).

Tinajas Altas fault zone (Class A) No. 1019

Last Review Date: 1998-03-04

Compiled in cooperation with the Arizona Geological Survey

citation for this record: Pearthree, P.A., compiler, 1998, Fault number 1019, Tinajas Altas fault zone, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, <https://earthquakes.usgs.gov/hazards/qfaults>, accessed 12/14/2020 02:20 PM.

Synopsis

The Tinajas Altas fault zone consists of two northwest-trending faults located on the eastern margin of the Yuma Desert, southeast of Yuma in southwesternmost Arizona and Sonora, Mexico. The Tinajas Altas and Gila Mountains form the eastern margin of the northwest-trending Fortuna basin. The Tinajas Altas fault zone bounds parts of the west side of the Tinajas Altas Mountains, and locally the fault zone is within the mountain range. Faulting has produced two very linear, short (<5-km-long) mountain fronts on the southwest side of the Tinajas Altas Mountains. No scarps or other evidence of deformation of latest Quaternary or younger deposits have been documented. Low bedrock ridges and inselbergs lie between the two fault strands. The presence of

	knobs of bedrock having similar lithology as the main mountain mass on the west side of the Tinajas Altas fault zone implies that the fault zone may be a very narrow graben. Alternatively, the subparallel orientation of the Tinajas Altas fault zone and San Andreas system suggests that the Tinajas Altas may have accommodated primarily dextral displacement.
Name comments	Tucker (1980 #2107) referred to the fault as the Tinajas Altas W2 mountain front. The general geology of this area was mapped by Olmsted and others (1973 #2106), whereas Biggs and Demsey (1998, unpublished #2250) have conducted detailed surficial geologic mapping along the structure. The fault zone continues from Arizona for several kilometers into northwestern Sonora, Mexico.
County(s) and State(s)	YUMA COUNTY, ARIZONA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:250,000 scale. <i>Comments:</i> Trace based on detailed unpublished mapping at 1:24,000 scale (T. Biggs, Arizona Geological Survey)
Geologic setting	The Tinajas Altas fault zone is composed of two northwest-trending faults located southeast of the Algodones fault [944] on the margin of the Yuma Desert. The Tinajas Altas fault zone bounds parts of the west side of the Tinajas Altas Mountains, and locally the fault zone is within the range. The Yuma Desert is a broad plain between the Gila Mountains and the lowermost Colorado River; it is covered with locally-derived alluvium, deposits of the Colorado River, and eolian deposits. In the subsurface, the Yuma Desert consists of two separate, deep sedimentary basins. The Tinajas Altas and Gila Mountains form the eastern margin of the approximately 2000-m-deep Fortuna basin, the easternmost of the two basins (Olmsted and others, 1973 #2106).
Length (km)	7 km.
Average strike	N38°W
Sense of	Normal

movement	<i>Comments:</i> The presence of bedrock of similar lithology as the main mountain mass on the west side of the Tinajas Altas fault zone implies that normal displacement across the fault is not great, or that the fault zone is a very narrow graben (Tucker, 1980 #2107). Alternatively, the orientation of the Tinajas Altas fault zone subparallel with the San Andreas system suggests that it may have accommodated primarily dextral displacement (P.K. Knuepfer, oral commun., 1981).
Dip Direction	SW
Paleoseismology studies	
Geomorphic expression	Faulting is expressed as two very linear, steep, fairly low and short (< 5-km-long) mountain fronts on the southwest side of the Tinajas Altas Mountains. The mountain front becomes more embayed and sinuous to the northwest, suggesting less fault activity. Low bedrock ridges and inselbergs lie between the two fault strands. Based on the striking linearity of the mountain fronts, Tucker (1980 #2107) inferred possible Holocene faulting. However, recent detailed surficial geologic mapping of the area by Biggs and Demsey (1998, unpublished #2250) indicates that uppermost Pleistocene and younger deposits are not faulted. No scarps or other evidence of deformation of Quaternary deposits has been documented.
Age of faulted surficial deposits	Early Tertiary to late Cretaceous. Estimated age of deformed bedrock, which consists of granitic rocks of the Tinajas Altas Mountain. No evidence of deformation of Quaternary deposits has been documented.
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) <i>Comments:</i> No definitive evidence of faulting of Quaternary deposits has been found. All of the alluvium along the fault zone is quite young, probably uppermost Pleistocene and younger and thus stratigraphic evidence of Quaternary movement may be obscured by sedimentation. The fault has not ruptured during the latest Pleistocene or Holocene, but the striking linearity of the mountain fronts suggests that Quaternary fault activity is fairly likely.

Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr <i>Comments:</i> No data exist to determine a slip rate, but a low rate is inferred on the basis of slip rates on other Quaternary faults in the region.
Date and Compiler(s)	1998 Philip A. Pearthree, Arizona Geological Survey
References	#2250 Biggs, T.H., and Demsey, K.A., 1998, Surficial geology and geomorphology of the Tinajas Atlas area, Goldwater Air Force Range, southwestern Arizona: Report to the U.S. Air Force, Luke Air Force Base, 22 p., scale 1:24,000. #2106 Olmsted, F.H., Loeltz, O.J., and Irelan, B., 1973, Geohydrology of the Yuma area, Arizona and California: U.S. Geological Survey Professional Paper 486-H, 227 p., 17 sheets. #2107 Tucker, W.C., Jr., 1980, Tectonic geomorphology of the Luke Air Force Range, Arizona, <i>in</i> Jenney, J.P., and Stone, C., eds., Studies in western Arizona: Arizona Geological Society Digest, v. 12, p. 63-88.

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